

SOV/112-59-3-4713

8(6)

Translation from: Referativnyy zhurnal. Elektrotehnika, 1959, Nr 3, p 58 (USSR)

AUTHOR: Voronko, Ye. A.

TITLE: Construction of Electric Generating Stations in the Urals
(Stroitel'stvo elektrostantsiy na Urale)

PERIODICAL: V sb.: Energ. str-vo SSSR za 40 let. M.-L. Gosenergoizdat,
1958, pp 367-372

ABSTRACT: The following data is presented: a review of development of the Urals' raw-energy sources from 1913 up to date; detailed figures characterizing mechanization in various branches of work; cost of work per one ruble of cost of mechanisms; examples of new erection methods using assembled reinforced-concrete constructions, large-unit erection, etc. In 1958, 200-Mw turbines and 640-ton/hour, 230-atm, 610°C boilers are expected to be installed at the Urals electric generating stations.

V.V.M.

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SOV/97-58-8-9/13

AUTHORS: Voronko, Ye.A., Mints, V.B. and Voznesenskiy, V.A.,
Engineers

TITLE: Investigations of Deformation, Crack Formation and
Elastic Properties of Shell Concrete (Issledovaniya
deformativnosti, treshchinostoykosti i uprugikh svoystv
armotsementa)

PERIODICAL: Beton i Zhelezobeton, 1958, Nr 8, pp 308 - 311 (USSR)

ABSTRACT: Shell concrete could be used for making various facing
slabs. The shell concrete is actually a slab formed from
fine-concrete mix reinforced with steel mesh. In 1957,
a covered market place was constructed using spherical
"shell concrete" slabs spanning 15 m. The All-Soviet
Institute Orgenergostroy designed spherical shape shell
concrete slabs spanning 12 m, and also slabs for warehouses
and other buildings spanning 24 m. Various tests were
carried out to ascertain the physical and mechanical
properties of these concrete slabs by the factory for pre-
cast reinforced concrete of the Kuybyshevgidrostroy. The
test samples were 1 200 x 475 mm in plan and 10 cm thick.
Altogether, 30 various testing samples were investigated,
ranging in thickness from 8 - 16 mm reinforced with

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Investigations of Deformation, Crack Formation and Elastic
Properties of Shell Concrete

300 - 500 kg/m³ of shell concrete. Portland cement Mark 500 was used for these tests. 1 000 kg cement/m³ of sand was used and the water/cement ratio was 0.24-0.3 (GOST 3100-51). Woven steel mesh was used as a reinforcement. The wires were of 0.7, 1.2 and 2.4 mm in diameter and the mesh squares 8 x 8 mm. The average strength of the mesh is 36 kg/mm². Slabs were cast into metal moulds and the consolidation of the concrete was carried out by vibrator I-7 for a period of 3 to 4 minutes, after which the surface was trowelled by cement grout. Some of the testing samples were cured for 8 hours at a temperature of 55 - 60 °C and some were hardened under normal conditions. From the mechanical properties of the shell-concrete, the tensile limit of elasticity in bending was determined. The test sample was loaded by four forces and the experiments were carried out in a specially prepared rig consisting of a load-bearing frame on which were placed cross pieces, with supporting shafts, which transmit the loads. The loading on the specimen was achieved with heavy rollers connected by

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a system of wires and pulleys to the loading arm. Loading was carried out by equal steps causing a stress of

$10 - 12 \text{ kg/cm}^2$ up to a total stress of 200 kg/cm^2 , after which the step was increased to three times its previous size. Each step was held for 10 minutes when loading and 15 minutes when unloading. The specimen was examined and measurement made of the width of the cracks at each stage in the zone between the extreme supports. In accordance with the assumption of Professor Nervi that concrete reinforced with thin steel mesh in a quantity of

$400/500 \text{ kg/m}^3$ behaves as a homogeneous material, all calculations were made by methods of formulae developed for such materials. The relation between the deflection and the load is linear in the first stages of the experiment, showing that the material is still in the elastic regime. From the deflection, the modulus of elasticity can be derived. The modulus at certain limiting stresses remains constant, which confirms that shell-concrete, as a homogeneous material, behaves elastically for stresses which in certain

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Properties of Shell Concrete

cases can reach 150 kg/cm^2 . Moreover, the region of constant modulus increases as its absolute value decreases. The modulus of elasticity increases as the diameter of the reinforcing wire decreases. These deductions can aid in the choice of shell-concrete for the building under consideration. Thus, for example, for structures where rigidity and stability are the criteria, a high modulus shell-concrete must be used reinforced with thin steel mesh. The relation between the width of the crack and the stress is also discussed in detail. Initially, the cracks develop slowly but later new cracks appear while the earlier ones do not grow wider. Shell-concrete is highly stable to crack formation. The cracks develop parallel to each other transversely to the reinforcing wire at a distance one from the other equal to that between the wires of the mesh. Shell-concrete is more elastic than ferro-concrete. There are 6 figures and 2 tables.

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VORONKO, Ye.A., inzh.; MINTS, V.B., inzh.; VOZNESENSKIY, V.A., inzh.

Testing strain capacity, elasticity, and crack resistance of
reinforced cements. Bet. i zhel. bet. no. 8:308-311 Ag '58.
(MIRA 11:8)

(Cement--Testing)

3.2430
3.2100
AUTHORS:

Mandel'shtam, S.L., Tindo, I.P., Voron'ko, Yu.K.,
Vasil'yev, B.N. and Shurygin, A.I.

TITLE:
SOURCE:

Studies of solar X-ray emission. II
Akademiya nauk SSSR. Iskusstvennye sputniki Zemli.
no.11. Moscow, 1961. Rezul'taty nauchnykh
issledovaniy, provedennykh vo vremya poletov vtorogo
i tret'ego kosmicheskikh korabley-sputnikov, 3-14

TEXT:

Zemli, no.10, Izd-vo AN SSSR, 1961, p.12) the authors reported
measurements of the intensity of solar X-ray emission below 10 Å
which were carried out with the aid of geophysical rockets. In
the present paper they report the corresponding results obtained
with the second and third Soviet spaceships on August 19-20 and
December 1-2, 1960. The aim of the measurements was to investi-
gate the intensity over an extended period of time (of the order
of a day or two). Preliminary results have been given by the
authors in another paper (Ref.2: Dokl. AN SSSR, 140, 1058, 1961).
The second spaceship carried six end-window photon counters
(15 mg/cm² beryllium foils) with an oxygen-neon quenching mixture.

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* 5/560/61/000/010/002/016

Studies of solar X-ray emission. II S/560/61/000/011/001/012
developed under the direction of I. A. P.
E032/E514

Studies of solar X-ray emission.II S/560/61/E
E032/E514

These counters were developed under the direction of I. A. Prager and S. M. Perel'man. The counters had a sensitivity of between 0.1 and 0.2 pulses/photon in the wavelength range 3-7.5 Å. The counters were mounted so that their axes were oriented along six directions at equal angles to each other; the field of view of each counter was 45°. The telemetric record showing the counting rate as a function of time is reproduced. It is estimated that during the flare in the range 2-10 Å, which was recorded that $7 \cdot 10^{-3} - 1.5 \cdot 10^{-2}$ erg cm⁻² sec⁻¹ (15 hr 33 min) was recorded by the third spaceship somewhat modified. The apparatus mounted on the employed so that the solar radiation continuously monitored together with interference below 10 Å could be CbT-9 (SBT-9) counters located in a lead screen 1 mm thick. In addition, there were two parallel-connected by solar batteries. "counters" which were mounted at right angles to two "control the sun. A tantalum plate was placed in front of the direction of

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Studies of solar X-ray emission.II S/560/61/000/011/001/012
E032/E514

windows and served as a target for the radiation-belt particles. The counters were practically insensitive to solar X-ray radiation. A third pair of counters was mounted on the outer surface of the third spaceship. These counters were similar to those carried by the second spaceship. The aim was to estimate the spectral energy distribution by comparing the indications of the beryllium and the mica counters. The telemetric record obtained with the aid of the third spaceship is reproduced. It is estimated that the flux of radiation below 10 \AA was $2.5 \cdot 10^{-4} \text{ erg cm}^{-2} \text{ sec}^{-1}$. Moreover, the intensity of radiation in this spectral region remained constant within $\pm 20\%$ during the observations. This was due to the fact that on December 1-2, 1960 the sun was very quiet and there was only one flare (importance 1⁺). The question of the flux and the energy of the particles recorded in these experiments is being examined at the present time. There are 10 figures and 2 tables.

SUBMITTED: June 26, 1961

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32430(1482,2806)

172450
AUTHORS:33304
S/560/61/000/010/002/016
D299/D302
Mandel'shtam, S. L., Tindo, I. P., Voron'ko,
Yu. K., Shurygin, A. I., and Vasil'yev, B. N.TITLE:
Study of solar X-radiation. I. Geophysical-
rocket measurementsSOURCE:
Akademiya nauk SSSR. Iskusstvennyye sputniki
Zemli. no. 10. Moscow, 1961, 12-21TEXT: This is the first of 3 investigations on X-radiation
in the range below 10 Å carried out by research rockets and the
2nd and 3rd Sputniks. Provisional results of these measurements
were set forth in brief in an earlier study. Experimental
method: The measurements described in the present article were
carried out during the flight of 2 research rockets. The prime
object of the measurements was to accumulate experimental data
and to develop a method for subsequent measurements by means of

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X

Study of solar...

earth-satellites. As detectors, photon counters were used, as these are more sensitive in the spectral range $< 10 \text{ \AA}$ than vacuum photomultipliers. The sensor unit was placed on the instrument container which turned automatically towards the sun. Special precautions were taken to ensure that no corpuscular radiation should interfere with the measurements. In the first launching, the sensor unit incorporated 2 similar counters directed towards the sun; one of the counters had a magnetic shield, and the other had none. In the second launching, both counters had magnetic shields, but the second counter was at an angle of 15° towards the sun, recording non-solar radiation only. Standard counters of type CBT-9 (SBT-9) were used. The characteristics of the counters are described. The counting rate was calculated from the telemetered data. The 2 rockets were launched on July 21, 1959, in the morning and evening respectively. On that day, the solar activity was intense. Results: A figure shows the dependence of the counting rate on altitude.

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A considerable X-ray flow was recorded from altitudes of 95 km up. Owing to the stability of orientation of the container with respect to the sun, it was unnecessary to make allowance for the angular dependence of counter efficiency. From the counting-rate data, the energy distribution and the magnitude of the energy flux outside the atmosphere were calculated. The data processing was based on the expression $m_{incl} = m_{vert} \Phi(z)$,

where m_{incl} is the mass of an inclined air-column of 1 cm^2 cross-section lying between the apparatus and the sun, m_{vert} -- the mass of a vertical column equal to the atmospheric pressure at the given altitude, and $\Phi(z)$ is determined by the zenith angle of the sun z . A figure shows the counting rate as a function of m_{incl} . Assuming the spectral region under investigation to be continuous, it is possible to construct the photon-distribution curve by means of the counting-rate curves, the mass

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coefficients of absorption of air, and the spectral-sensitivity curve of the counters. A figure shows the photon-distribution curves as a function of wavelength. The energy distribution in the morning and evening launchings was found to differ by a factor of 3. It is difficult to ascertain whether this difference is real. The main source for the continuous radiation is electron bremsstrahlung in the field of hydrogen and helium ions. The obtained electron temperature considerably exceeded the value of $T_e \sim 1 \div 3 \times 10^6$ °K obtained in subsequent investigations by space-ships. A comparison of measurements conducted by Friedman (in 1953) during a minimum-period of solar activity with the authors' measurements (in December 1960, by space-ship) after a maximum-phase showed that the temperature and intensity of radiation are greatly dependent on the phase of the sun cycle. As the above-described rocket investigations were carried out for very low positions of the sun above the horizon (in contra-

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distinction to Friedman's investigations), further systematic measurements are required. In ensuing articles, the results of measurements carried out on the 2nd and 3rd Sputniks will be given, as well as a description of the electronic equipment. There are 11 figures and 20 references: 8 Soviet-bloc and 12 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: G. Elwert, J. Geophys. Res., 66, 391, 1961; H. Friedman, Trans. Intern. Astr. Un., 10, 706, 1960, Cambridge Univ. Press; T. A. Chubb, H. Friedman, R. W. Kreplin, J. Geophys. Res., 65, 1831, 1960; R. W. Champion, R. A. Minzner, Plan. and Space Science, 1, 259, 1959.

SUBMITTED: May 17, 1961

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3.2420 (1049, 1462)

29115
S/020/61/140/005/01 /022
B104/B102

AUTHORS: Vasil'yev, B. N., Voron'ko, Yu. K., Mandel'shtam, S. L.,
Tindo, I. P., and Shurygin, A. I.

TITLE: Preliminary results of a study of solar x-radiation by means
of rockets and space ships

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 140, no. 5, 1961, 1056-1061

TEXT: By means of two geophysical rockets (July 21, 1959, altitude
105 km), the second space ship (August 19-20, 1960, altitude of peri-
helion 305 km, aphelion 320 km), and the third space ship (December 1-2,
1960, perihelion 180 km, aphelion 249 km), solar radiation in the
spectral range below 10 Å was studied. End-window photon counters with
aluminum coated (2μ) mica windows (1.6 mg/cm^2 , $d = 4 \text{ mm}$) were attached
outside the apparatus container which left the rocket and turned
automatically to the sun. By means of magnetic systems, the windows of
counters were shielded from 15-20 kev electrons which might cause
bremsstrahlung. At an altitude of 95 km, the counting rate of counters
oriented toward the sun increased. This radiation was considered to be

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Preliminary results of a...

an x-radiation. Using data of V. V. Mikhnevich et al. (Izv. AN SSSR, ser. geofiz., no. 11, 1393 (1957)) results of measurement were extrapolated for the boundary of atmosphere. Radiation fluxes ($2-10 \text{ \AA}$) obtained were $7.3 \cdot 10^{-4}$ and $3.2 \cdot 10^{-4} \text{ erg/cm}^2 \cdot \text{sec}$. On the second space ship, six end-window photon counters with beryllium windows (0.1 mm thick, 7 mm in diameter) were used. Counters were arranged vertical to each other. The counting rate amounted to some thousand pulses/sec when the counters were exposed to solar radiation. On that part of the orbit which was in the earth's shadow it was some ten pulses/sec (cosmic background), and reached high values only when the orbit approached the outer radiation belt. From the results of measurements in the shadow-region, the authors concluded that a radiation from the radiation belt did not occur below $30-40^\circ$ north and $20-30^\circ$ south. A radiation flux of $7.6 \cdot 10^{-4} \text{ erg/cm}^2 \cdot \text{sec}$ was obtained. On the third space ship, two counters with mica windows (1.6 mg/cm^2 , $d = 4 \text{ mm}$) covered on both sides with aluminum foils (5μ) were switched in parallel. These two counters were oriented toward the sun. Two other counters of the same type were arranged vertical to the former. Tantalum plates were located in front

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Preliminary results of a...

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of the windows of these control counters. They recorded radiation caused by slowing down electrons in the tantalum plates. In the instrument container two other beryllium window counters were installed. Thus, it was possible to separate the background of x-radiation caused by electrons from the solar x-radiation. An x-radiation flux of $2.4 \cdot 10^{-4}$ erg/cm².sec was obtained in the range 2-10 Å. The electron temperature of solar radiation in the spectral range investigated was estimated to be $\sim 2 \cdot 10^5$. H
I. S. Shklovskiy (Izv. Krymsk. astrofiz. obs., 4, 80 (1949)),
T. V. Kazachevskaya and G. S. Ivanov-Kholodnyy (Astr. zhurn., 36, 1022 (1959)), S. N. Vernov and A. Ye. Chudakov (Usp. fiz. nauk, 70, no. 4, 585 (1960)), and L. V. Kurnosova et al. (Sborn. Iskusstvennyye sputniki Zemli, no. 10 (1961)) are mentioned. There are 4 figures and 7 references; 5 Soviet and 2 non-Soviet. The three most recent references to English-language publications read as follows: T. A. Chubb, H. Friedman, R. W. Kreplin, J. Geophys. Res., 65, no. 6, 1831 (1960); H. Friedman, Astronautics, no. 11, 42, 128 (1960); J. A. Van Allen, L. A. Frank, Nature, 183, 430 (1959).

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Preliminary results of a...

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S/020/61/140/005/011/022
B104/B102

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR)

PRESENTED: May 24, 1961, by D. V. Skobel'tsyn, Academician

SUBMITTED: April 19, 1961

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VORONKO, Yu. K.

MANDELSHTAM, S. I., VASILYEV, B. N., VORONKO, Yu. K., TINNO, K. P., SHURGIN, A.

"Measurements of Solar X-ray Radiation"

Soviet Papers Presented at Plenary Meetings of Committee on Space Research
(COSPAR) and Third International Space Symposium, Washington, D. C.,
23 Apr - 9 May 62

MANDELSHTAM, S. L., TINDO, I. P., VORON'KO, Yu. K., VASILYEV, B.N., and SHURGIN, A. I.

"The Intensity of The X-ray Radiation of The Sun Near The Short-Wave Edge of The Spectrum"

report presented at the 13th Intl. Astronautical Federation Congress (FAI)
Varna, Bulgaria, 23-29 Sep 1962

S/020/62/142/001/015/021
B104/B102

AUTHORS: Mandel'shtam, S. L., Voron'ko, Yu. K., Tindo, I. P.,
Shurygin, A. I., and Vasil'yev, B. N.

TITLE: Study of solar X-ray emission during the total solar eclipse
on February 15, 1961

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 1, 1962, 77-80

TEXT: The shortwave range ($< 10 \text{ \AA}$) of the solar spectrum was examined with photon counters described in previous papers of the authors (DAN, 140, no. 5, 1058 (1961); Sborn. Iskusstvennye sputniki Zemli, (a) no. 10, 1961, p. 13; (b) no. 11, 1961, p. 3). A. P. Lukirskiy helped in determining the spectral sensitivity of the apparatus at the Leningradskiy gosudarstvennyy universitet (Leningrad State University), using a method of Lukirskiy, M. A. Rumsh, and L. A. Smirnov (Optika i spektroskopiya, 2, 505 (1960)). The counters had been developed under the supervision of I. A. Prager and S. M. Perel'man. The counter block was mounted on the outside of the instrument container of a geophysical rocket. The counters always faced the Sun. The container reached an altitude of about 96 km. The emission

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of the solar corona is continuous in the spectral region in question and has no intense lines. The energy distribution of solar emission and the energy flux in the spectral range under consideration were determined from the variations of the count rate with altitude, with the spectral sensitivity of the counters, and with the mass absorption coefficient of air (Fig. 3). The emission of the totally covered corona in the spectral range in question had an intensity of $4 \cdot 10^{-4}$ erg/cm²·sec. The shortwave part of the solar spectrum is emitted from all those parts of the corona, in which the 5303 Å line is also excited. There are 4 figures, 1 table, and 7 references: 4 Soviet and 3 non-Soviet. The two references to English-language publications read as follows: G. Elwert, J. Atm. Terr. Phys., 12, 187 (1958); J. Geophys. Res., 66, 391 (1961).

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR
(Physics Institute imeni P. N. Lebedev of the Academy of Sciences USSR)

PRESENTED: July 4, 1961, by A. A. Blagonravov, Academician
SUBMITTED: June 27, 1961

Card 2/12

HANDEL'SHTAM, S.L.; VASIL'YEV, B.N.; VORON'KO, Yu.K.; TINDO, I.P.;
SHURGIN, A.I.; FETISOV, B.N.

"Of the short-wavelength end of the sun spectrum by means of
satellites and rockets."

Report presented at the Spectroscopicum, 11th Intl. Colloq.,
Belgrade, Yug, 30 Sep - 4 Oct 63.

Colloq.

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EWT(1)/FCC(W)/FS(Y)-2/BDS/EEC-2/ES(V)

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ASD/AFHDC/ESB-3/APGC Pe-4/Pb-4/Pl-4/Pd-4/Pt-4 TT/01
ACCESSION NR: AT3006863 S/2500/63/000/015/0025/0091 101
G6

AUTHOR: Vasil'yev, B. N.; Shurygin, A. I.; Tind, I. P.;
Voron'ko, Yu. K.

TITLE: Study of x-ray radiation from the sun. III. Electronic equipment

SOURCE: AN SSSR. Iskusst. sputniki Zemli, no. 1, 1963, 85-91

TOPIC TAGS: radiation, solar radiation, x-ray, x-ray radiation, solar x-ray radiation, counter, radiation counter, Geiger counter, telemetry, telemetry transmitter, TM transmitter, satellite, sputnik 6, sputnik, sputnik 5

ABSTRACT: A detailed description is given of x-ray measuring equipment carried on Soviet sounding rockets and later on Sputniks 5 and 6 [animal-carrying satellites of August and December 1960], whose purpose was to record soft x-ray radiation from the sun using photon counters of the Geiger type. The rockets had one counter

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ACCESSION NR: AT3006863

continuously oriented toward the sun and a reference counter set 15° away from the sun. Sputnik 5 carried six identical counters, hard-mounted outside the instrument compartment on opposite ends of three mutually orthogonal axes and all feeding into a common counting and storage channel. Sputnik 6 carried three variants as follows: 1) sun-tracking counters with mica windows; 2) sun-tracking reference counters, also with mica windows, which recorded bremsstrahlung from sun-oriented tantalum deflection plates; and 3) two fixed counters with beryllium foil windows. Each counter set fed its own counting and storage circuitry as shown in Fig. 1 of the Enclosure. In general, a Geiger counter output was fed to a blocking oscillator pulse-shaping stage, then to binary trigger elements and divider stages, and finally to the telemetry encoding unit and/or memory stage. The main difference between the rocket and sputnik systems was that the former had no storage but telemetered the count continuously, whereas the sputniks could store the count over a daily period and transmit it on command from a ground station. In the sputniks the memory circuitry registered a count every three minutes; thus the difference

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between two successive total counts on readout yielded a mean count rate. Sputnik 5 was able to transmit the current count directly in addition to storing it; Sputnik 5 did not have this direct transmission feature. The pulse shapers, triggers, dividers, and encoders were transistorized and mounted as separate subassemblies in a hermetically sealed container connected to the Geiger counter. Schematics are given for each of these stages, together with descriptions of circuit functions, including temperature compensation to ensure stable operation over the $\pm 50^{\circ}\text{C}$ range. Performance limits of the counter systems were as follows: 1) rocket mounted counters had an impulse rate of 0.1 to 3000 per sec; 2) Sputnik 5 counters had an impulse storage rate of 0.1 to 5000 per sec and a total storage capacity of 2^{20} pulses; and 3) Sputnik 6 counters had an impulse storage rate of 0.1 to 5000 per sec and a total capacity of 2^{17} pulses for the mica aperture counter and 2^{20} pulses for the beryllium aperture type. A functional diagram of a Sputnik counter system is shown in Fig. 2 of the Enclosure. "The authors thank the project's director Prof. S. L. Mandel'shtam. The authors also thank M. A. Minayev, V. E. Sukhanov and L. T. Shapovalov who participated in the preparation and operation of the devices described."

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L 33262-66 EWT(1)/FSS-2 TT/GW

ACC NR: AR6017229

SOURCE CODE: UR/005B/65/000/012/D023/D023

AUTHORS: Mandel'shtam, S. L.; Vasil'yev, B. N.; Voron'ko, Yu. K.; Tindo, I. P.; 64
Shurygin, A. I.; Fetisov, Ye. N. B

TITLE: Investigations of the short-wave end of the solar spectrum with the aid of
satellites and rockets 12

SOURCE: Ref. zh. Fizika, Abs. 12D177

REF SOURCE: Tr. Komis. po spektroskopii. AN SSSR, t. 3, vyp. 1, 1964, 36-54

TOPIC TAGS: solar spectrum, solar corona, solar radiation, geophysic rocket, scientific satellite

ABSTRACT: The radiation of the sun was investigated experimentally and theoretically in the spectral region below 10 Å. It is established that this radiation has a continuous spectrum and is due to recombination of electrons and "heavy" ions in the solar corona. The measurements of the electron temperature of the radiating regions of the corona in different experiments yielded values between 1.5 and 4×10^6 °K; the flux of radiation at the limit of the earth's atmosphere is $2 - 8 \times 10^{-4}$ erg/cm²-sec. [Translation of abstract]

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ACCESSION NR. 124044155 DATE 8/21/81 BY 006/CIO9/2139/1400

AUTHOR: Voron'ko, Yu. K.; Zverev, G. M.; Meshkov, B. B.; Starinov, A. T.

TITLE: Investigation of optical and paramagnetic resonance spectra
of Er^{3+} in CaF_2

SOURCE: Fizika tverdogo tela, v. 6, no. 9, 1954, p. 1694

TOPIC TAGS: rare earth compound; electron paramagnetic resonance;
light absorption; luminescence; calcium fluoride laser; crystal
symmetry; Stark splitting

ABSTRACT: In view of the need of detailed information on the properties of crystals containing rare-earth ion admixtures, which are used for lasers, the authors investigated the electron paramagnetic resonance (EPR) spectrum, the optical absorption, and the luminescence of crystals of CaF_2 doped with Er^{3+} and grown by different

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ACCESSION NR: AP4044955

methods. The luminescence and absorption spectra were obtained at 4.2 and 77K using DPS-13 and DFS-8 spectrophotographs and the ERS-13 spectrometer. The EPR study established the symmetry of the surrounding of the Er³⁺ ions in these crystals. Two types of crystals were grown, one in a fluoridizing atmosphere at a pressure which did not ensure complete removal of the oxygen impurities, and one at a pressure high enough to eliminate the oxygen. The erbium concentration in the crystals was ~0.1%. The EPR data show that there are at least four essentially different types of Er³⁺ centers, having different surrounding symmetries and different crystalline field strengths. The EPR method makes it possible to study all these ions separately. On the other hand, the optical spectra yielded lines corresponding to all possible symmetries of the surrounding of the Er³⁺ ions in the spectra. To relate the two methods, the spin-lattice relaxation of the Er³⁺ ions in the Cu₂O was measured at 2-45K, and the distances to the nearest excited Stark components of the lower level of these ions were determined. These data were

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used in the analysis of the optical spectra. In addition, a theoretical interpretation of the level splitting in the crystalline field is presented (in the cubic-field approximation) for Br^{3+} ions in a tetragonal surrounding. The authors are grateful to A. M. Frokhorov for interest and to V. V. Oshko for valuable discussions.
Orig. art. has: 6 figures, 3 formulas, and 3 tables.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University)

SUBMITTED: 18Apr64

ATD PRESS, 3110

INCL: 00

SUB CODE: OP, SS

TR RPP SIOV 004

OTHER: 114

Card 3/3

L 22571-65 EPF(c)/EPR/EWT(m)/EMP(n)/EMB(t) Pr-6/Td-10 ICP(f) JN/JD
ACCESSION NR: AP5003446 S/0181/61/001/001/0267/0213

AUTHOR: Voron'ko, Yu. K.; Oseiko, V. V.; Udovenchikov, V. T.; Furzikov, M. M.

TITLE: Optical properties of calcium fluoride doped with triply ionized dysprosium

27

SOURCE: Fizika tverdogo tela, v. 7, no. 1, 1965, 247-273

TOPIC TAGS: calcium fluoride, absorption spectrum, emission spectrum, luminescence, laser material, laser dysprosium, rare earth element, luminescence center

ABSTRACT: The absorption, emission, and excitation spectra of CaF₂ doped with Dy³⁺ were investigated using samples which differed in chemical composition and in their growth conditions. It was found that there are at least three types of Dy³⁺ doped CaF₂ crystals. The differences can be attributed to a set of optical centers characteristic of each type of crystal. Centers of tetragonal symmetry characterize Type I crystals and centers of trigonal symmetry, Type II. The center structure of type III crystals could not be determined. It was

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L 22571-65
ACCESSION NR: AP5003446

established that electronic transitions of Dy³⁺ centers correspond to electronic transitions of the free ion. The oxygen impurities in the Dy³⁺ ion are responsible for the appearance of specific absorption bands in the short-wavelength ultraviolet part of the spectrum. Investigation of the optical properties of chemically different Dy³⁺-doped CaF₂ crystals has shown that the crystals are rarely mixtures of more than one type. Orig. art. has: 3 figures and 2 tables. (ds)

ASSOCIATION: Fizicheskiy institut imeni P. N. Lebedeva (Physics Institute)

SUBMITTED: 09 May 64

ENCL: 00 SUR CODE: 88

NO REF Sov: 002

OTHERS: 001

AMT PRB#0: 3172

Card 2/2

1 50955-66 EWT(8)/T/EWP(t)/ETI IJP(c) JW/JD/JG

ACC NR: AT 6020041

(A)

SOURCE CODE: UR/2564/65/005/000/0383/0290

42

B+1

AUTHOR: Voron'ko, Yu. K.; Osiko, V. V.; Fursikov, M. M.

ORG: none

TITLE: The study of the structure of $\text{CaF}_2\text{-Sm}^{3+}$ crystals by optical means

SOURCE: AN SSSR. Institut kristallografii. Rost kristallov, v. 5, 1965, 383-390

TOPIC TAGS: crystal optic property, crystal absorption, crystal growing, calcium fluoride

ABSTRACT: The present paper reports on studies of absorption, luminescence, and excitation spectra of a large number of $\text{CaF}_2\text{-Sm}^{3+}$ crystals grown under various conditions with the aim of establishing a fast method for the study of the structure of fluorite crystals. An analysis of the results shows that in $\text{CaF}_2\text{-Sm}^{3+}$ crystals there are basically three types of optical centers the relative concentration of which depends on the conditions under which the crystals were produced. If no oxygen admixtures are present, the crystals contain a single type of centers (I) of tetragonal symmetry, as determined by P. P. Pashinin of the Oscillation Laboratory of the Physics Institute, AN SSSR, (Laboratoriya kolebaniy Fizicheskogo instituta AN SSSR) using electron paramagnetic resonance. These centers consist of $\text{Sm}^{3+}\text{-F}^{1-}$ ion pairs located at one of the

Card 1/2

L 36955-66

ACC NR: AT6020041

nearer internodal points. Type II centers have a trigonal symmetry and seem to consist of $\text{Sm}^{3+}-\text{O}_2^-$ ion pairs. The structure of type III centers is not yet understood. Orig. art. has: 3 figures and 1 table.

SUB CODE: 20/ SUBM DATE: 00/ ORIG REF: 004/ OTH REF: 003

Card 2/2 *llm*

ACC NR: AP7000005.

SOURCE CODE: UR/0070/66/011/006/0936/0938

AUTHOR: Voron'ko, Yu. K.; Kaminskiy, A. A.; Osiko, V. V.; Fursikov, M. M.

ORG: Physics Institute im. P. N. Lebedev (Fizicheskiy institut); Institute of Crystallography, AN SSSR (Institut kristallografiyi AN SSSR)

TITLE: Cerofluorite with neodymium admixture as active laser material

SOURCE: Kristallografiya, v. 11, no. 6, 1966, 936-938

TOPIC TAGS: crystal laser, laser optic material, laser emission, calcium fluoride, fluorite, cerofluorite, absorption spectrum, luminescence spectrum

ABSTRACT: Preliminary data were reported on absorption and luminescence spectra and stimulated emission of neodymium activated cerofluorite ($\text{CaF}_2 - \text{CeF}_3$) crystals. The material was selected for the study because earlier studies of the mixed fluoride crystals of elements of groups II and III indicated the possibility of obtaining laser action with a low (~ 10 J) generation threshold at room temperature. The cerofluorite crystals activated with 0.5–1.0 wt% Nd were grown by a method previously described [A. A. Kaminskiy, V. V. Osiko. Neorganicheskiye materialy, 1, 2043, 1965]. Crystal rods ~ 45 mm long and ~ 55 mm in

Cod 1/2

UDC: 548.0:535:80

ACC NR: AP7000005

diameter were used in the experiments. Very broad peaks characterized the electronic spectra of cerofluorite crystals as of the similar mixed fluoride crystals. The peaks were unresolved even at 77K. Spiked output was obtained on the $\sim 10657 \text{ \AA}$ line from the cerofluorite crystal activated with $\sim 1.0\%$ Nd at a pump energy of $\sim 50 \text{ J}$ delivered to an IFFP-800 xenon flash lamp. The cavity was formed by confocal spherical mirrors with dielectric coating. Width of the emission line was $\sim 3 \text{ cm}^{-1}$ for an excitation energy nearly equal to the threshold energy. Generation characteristics of the crystal were not inferior to those of the best $\text{CaF}_2-\text{Nd}^{3+}$ crystals, although the cerofluorite crystals used were optically heterogeneous. Energy transfer between different optical centers of Nd was assumed to be the mechanism of the generation mode. Orig. art. has: 2 figures.

SUB CODE: 20/ SUBM DATE: 27Nov65/ ORIG REF: 008/ OTH REF: 003/
ATD PRESS: 5107

Card 2/2

L 46107-66 EWT(1)/EWT(m)/T/EWP(t)/ETI LIP(c) JD/JW/GG
ACC NR: AP6023908 SOURCE CODE: UR/0363/65/002/007/1161/1170

AUTHOR: Voron'ko, Yu. K.; Kaminskiy, A. A.; Osiko, V. V.; Prokhorov, A. M.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy
institut Akademii nauk SSSR); Institute of Crystallography, Academy of Sciences, SSSR
(Institut kristallografiyi Akademii nauk SSSR)

TITLE: New type of crystals for lasers with optical excitation

SOURCE: AN SSSR. Izv. Neorg materialy, v. 2, no. 7, 1966, 1161-1170

TOPIC TAGS: fluoride, neodymium, laser optic material, lanthanum compound, cerium
compound, yttrium compound, barium compound, strontium compound, calcium fluoride,
mixed crystal

ABSTRACT: The paper reports new results obtained from a study of the optical properties
and induced emission at 300°K of a group of crystals of mixed fluorides containing
a neodymium admixture. All the crystals contained from 0.5 to 2.0% Nd³⁺ and had
the following composition: CaF₂-YF₃ (1, 2, 3, 7%); CaF₂-CeF₃ (7%); SrF₂-LaF₃ (30%);
BaF₂-LaF₃ (30%). The absorption and luminescence spectra of the crystals at 300 and
77°K were studied. The synthesized mixed fluorides constitute a new type of laser ma-
terials. Structurally they are typical crystals, but from the standpoint of their
spectral properties, they occupy an intermediate position between crystals and glasses.
The thresholds of generation excitation were found to be much lower than in crystals.

UDC: 546.161:548.55

Card 1/2

L 45102.56

ACC NR: AP6023908

of pure fluorides, and the efficiency was found to be several times higher. The working concentrations of neodymium in the mixed fluorides are several times higher than in $\text{CaF}_2\text{-Nd}^{3+}$. The weaker concentration quenching is apparently due to the removal of the structural degeneracy of the optical centers. Migration of the excitation energy between various groups of La^{3+} optical centers is possible in the mixed fluoride crystals. The latter may prove effective as sources of excitation for semiconductor lasers.
Orig. art. has: 7 figures and 2 tables.

SUB CODE: 20 / SUBM DATE: 30Dec65 / ORIG REF: 015 / OTH REF: 010

Card 2/2 JS

L 49104-66 ENT(1) FCC/FSS-2 GW	ACC NR: AR5018942	SOURCE CODE: UR/0260/65/000/007/0052/0052
AUTHOR: Mandel'shtam, S. L.; Vasil'yev, B. N.; Voron'ko, Yu. I.; Tikhon, I. P.; Shurygin, A. I.; Fetisov, Ye. N.		43 B
ORG: none		
TITLE: Studies of the shortwave end of the Sun's spectrum with the help of satellites and rockets		
SOURCE: Ref. zh. Astronomiya. Otdel'nyy vypusk, Abs. 7.51.431		
REF SOURCE: Tr. Komis. po spektroskopii. AN SSSR, v. 1, 1964, 36-54		
TOPIC TAGS: sun, solar radiation intensity, solar radiation, solar corona		
TRANSLATION: Experimental and theoretical studies were made of the Sun's radiation in the spectrum area of $\lambda < \text{A}$. It was established that this radiation has a continuous spectrum and is dependent on the recombination of electrons and "heavy" ions in the solar crown. Various tests of the electron temperature in radiation areas of the crown gave values within limits of $(1.5 - 4)10^6$ °K; the flow of radiation at the edge of the Earth's atmosphere is $(2-8)10^{-4}$ erg/cm ² sec. References 1-5. Authors' resume.		
SUB CODE: 03 / SUBM DATE: none		
Card 1/1 (1C)		

L 20581-66	T/EWP(t)	IJP(c)	JD/M/JC	SOURCE CODE:	GE/0030/65/012/002/0905/0912
ACC NR: AP6002044					
AUTHOR: Bagdasarov, Kh. S.; Voronko, Y. M.; Kaminskii, A. A.; Krotova, L. V.; Osiko, V. V.					67 64 B
ORG: P. N. Lebedev Physical Institute of the Academy of Sciences of the USSR, Moscow; Institute of Crystallography of the Academy of Sciences of the USSR, Moscow					
TITLE: Modification of the optical properties of $\text{CaF}_2\text{-TR}^{3+}$ crystals by yttrium admixtures					
SOURCE: Physica status solidi, v. 12, no. 2, 1965, 905-912					
TOPIC TAGS: optic crystal, crystal imperfection, crystal impurity, yttrium compound, absorption spectrum, luminescence spectrum, equilibrium constant, fluoride, ionic crystal, rare earth element					
ABSTRACT: Absorption and luminescence spectra of $\text{CaF}_2\text{-Nd}^{3+}$ (type I) (V. V. Osiko, Crystal growth, Encyclopedic, v. 5, Publishing House of the Academy of Sciences SSSR, 1965) crystals were investigated as a function of the concentration of added yttrium fluoride. The appearance of new lines and a decrease in the line intensities because of the addition of yttrium is attributed to a shift in the equilibrium of Nd centers. Some possible models are discussed. The equilibrium of centers of rare-earth ions (TR^{3+}) in the presence of yttrium fluoride					
Card 1/2					

L 20501-66

ACC NR: AP6002044

in $\text{CaF}_2\text{-Nd}^{3+}$ crystals was calculated approximately. The authors thank S. P. Afanasev and M. F. Limanovskaya for the growth of crystals and V. B. Aleksandrov for his help in the experiment. Orig. art. has: 4 figures and 2 formulas. [Based on author's abstract] [J]

SUB CODE: 20/ SUBM DATE: 11Sep65/ ORIG REF: 008/ OTH REF: 005 [NT]

Card 2/2 BK

VORON'KO, Yu.K.; KAMINSKIY, A.A.; OSIKO, V.V.; PROKHOROV, A.M.

Selective excitation of the centers of rare-earth ions in
crystals. Pis'. v red. Zhur. eksper. i teorat. fiz. 1 no.4:
33-39 My '65. (MIRA 18:11)

1. Fizicheskiy institut imeni Lebedeva AN SSSR i Institut
kristallografii AN SSSR. Submitted April 16, 1965.

VORON'KO, Yu. K.; KAMINSKIY, A.A.; OSIKO, V.V.

Effect of hard radiations on the optical centers of trivalent rare earth ions in crystals. Pis'. v red. Zhur. ekspер. i teoret. fiz. 2 no. 10:473-478 N '65 (MIRA 19:1)

1. Fizicheskiy institut imeni Lebedeva AN SSSR. Submitted September 29, 1965.

L 12995-66 EWT(1)/FCC/EWA(h) GW

ACC NR: AR6000794

SOURCE CODE: UR/0169/65/000/009/A013/A013

10
B

SOURCE: Ref. zh. Geofizika, Abs. 9A75

AUTHOR: Mandel'shtam, S. L.; Vasil'yev, B. N.; Voron'ko, Yu. K.; Tindo, I. P.;
Shurygin, A. I.; Fetisov, Ye. N.

TITLE: Using artificial satellites and rockets to study the short-wave end of the solar spectrum

CITED SOURCE: Tr. Komis. po spektroskopii. AN SSSR, vyp. 1, 1964, 36-54

TOPIC TAGS: solar radiation, artificial earth satellite, solar corona

TRANSLATION: Solar radiation was experimentally and theoretically studied in the spectral region with wavelengths shorter than 10 angstroms. It was found that the radiation has a continuous spectrum and is due to recombination of electrons and "heavy" ions in the solar corona. Various experimental measurements of the electron temperature in the radiating regions of the corona gave values lying between 1.5 and $4 \cdot 10^6$ Kelvin; the radiation flux at the boundary of the terrestrial atmosphere is $2-8 \cdot 10^{-4}$ erg/cm²·sec.

SUB CODE: 08, 22/
Card 1/1 Hw

UDC: 523.72:629.195.2:629.192.2/3

VORON'KO, Yu.K.; KAMINSKIY, A.A.; KORNIYENKO, L.S.; OSIKO, V.V.; PROKHOROV, A.M.; UDOVENCHIK, V.T.

Study of the induced radiation from $\text{CaF}_2\text{-Nd}^{3+}$ (type II) crystals at room temperature. Pis'. v red. Zhur. eksper. i teoret. fiz. 1 no.2:3-7 Ap '65. (MIRA 18:10)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta i Fizicheskiy institut AN SSSR.

VORONIN, V.N., KUDRIK, A.A.; KIEV, V.V.; PROKHOROV, A.M.

Induced radiation of He^{3+} in CaF_2 at the wavelength $\lambda = 5512 \text{ \AA}$.
Pis'. v red. Zhur. ekspер. teor. fiz. 1 no.1:5-8 Ap '65.
(MIRA 18:9)

1. Fizicheskiy institut imeni P.N.Lebedeva AN SSSR i Institut
yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

VORON'KO, Yu.K.; KAMINSKIY, A.A.; OSIKO, V.V.; KHAIMOV-MAL'KOV, V.Ya.

Optical homogeneity of $\text{CaF}_2 - \text{Nd}^{3+}$ laser crystals. Izv. AN
SSSR. Neorg. mat. 1 no.9:1521-1525 S '65. (MIRA 18:11)

1. Institut kristallografi AN SSSR i Fizicheskiy institut
imeni Lebedeva AN SSSR.

ACC NR:	EWALK/FBD/EWT(1)/FBD(k)-2/T/EWP(l)/EWA(m)-2/EM(h)	SOURCE CODE:	UR/0363/6/001/012/2038/2092
AUTHOR:	Bagdasarov, Kh. S.; Voron'ko, Yu. K.; Kuminstiy, A. A.; Osiko, V. V.		
ORG:	Physics Institute im. P. N. Lebedev, Academy of Sciences USSR (Fizicheskiy institut Akademii nauk SSSR); Institute of Crystallography, Academy of Sciences SSSR (Institut kristallografii Akademii nauk SSSR)		
TITLE:	Fluoride-base systems as active quantum electronic materials		
SOURCE:	AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 12, 1965, 2088-2092		
TOPIC TAGS:	laser, infrared laser, solid state laser, stimulated emission, fluoride base laser		
ABSTRACT:		Stimulated emission in the infrared spectral region (10,540 Å) has been achieved with a low generation threshold (about 50 J) from Nd ³⁺ activated BaF ₂ -LaF ₃ single crystals at room temperature. The crystals, described as a new laser material, were grown by Stockbarger technique from a BaF ₂ -LaF ₃ mixture of variable composition with 1% NdF ₃ addition. The growth technique was described earlier [Yu. K. Voron'ko, V. V. Osiko, V. T. Udoenchik, M. M. Fursikov. Fiz. tv. tela, 7, 267 (1965)]. Preliminary study of the absorption and luminescence spectra of the crystals indicated the characteristics required for laser, i.e., an unusually high absorption coefficient in the 0.6—1.0 μ region at 300K and the highest luminescence intensity	
Card 1/2	UDC: 546.161		

L 9498-66

ACC NR: AP6001224

peak at 1.05μ , corresponding to $^4F_{3/2} - ^4I_{11/2}$ transition, also at 300K. The line width in the luminescence spectrum insignificantly increased with temperature increase from 77K to 300K. These favorable spectral characteristics were attributed to the distribution of Nd³⁺ ions between different types of electric crystal fields. Stimulated emission was excited with a Xe-flash lamp in single crystal rods (75 x 5.5 mm) in the cavity consisting of external confocal dielectric mirrors. The emission possessed usual laser characteristics as shown by the time dependence at different pumping energies. The physical properties of the crystals make possible a continuous laser emission at 300K. Orig. art. has: 4 figures. [JK]

SUB CODE: 20 / SUBM DATE: 13Jul65 / ORIG REF: 002 / OTH REF: 005 / ATD PRESS:

47164

Card 2/2

L 12824-66 ENT(L) AT

ACC-NR: AF6001775

SOURCE CODE: UF/D 86/65/002/010/0473/0478

AUTHOR: Voron'ko, Yu. K.; Kaminskij, A. A.; Osiko, V. V.

ORG: Physics Institute im. P. N. Lebedev, Academy of Sciences SSSR (Fizicheskiy
institut Akademii nauk SSSR)

TITLE: Effect of hard radiation on the optical centers of Tr^{3+} ions in crystals

SOURCE: Zhurnal eksperimental'noj i teoreticheskoy fiziki. Pis'ma v redaktsiyu.
Prilozheniya, v. 2, no. 10, 1965, 473-478

TOPIC TAGS: luminescence center, rare earth element, Gamma irradiation, crystal
symmetry

ABSTRACT: The authors have observed a new effect, wherein the structure and optical properties of the Tr^{3+} centers in crystals with Tr^{3+} impurity are changed by hard radiation. The investigations were carried out with the crystals $\text{CaF}_2:\text{Nd}^{3+}$ (0.3 wt.%), $\text{CAF}_2:\text{Er}^{3+}$ (0.3 wt.%), and $\text{CaF}_2:\text{Eu}^{3+}$ (0.3 wt.%, type I), synthesized by a procedure described earlier (FTT v. 7, 267, 1965). The absorption spectra were obtained with a diffraction spectrometer. In all crystals, irradiation greatly reduced the intensities of some lines and gave rise to new lines. From a comparison of the absorption coefficients at the line maxima before and after irradiation it is easily seen that: 1) the lines comprising a single system are decreased in like fashion, and 2) the decrease is strongest in rhombic-symmetry lines and practically nil in the tetragonal system. It is concluded that γ irradiation changes the structure of the optical Tr^{3+} centers, with some centers becoming disintegrated

Card 1/2

L 12824-66
ACC NR: AP6001775

and replaced by others of still unknown structure. Two possible mechanisms of TR^{3+} -center transformation are discussed. The ionic mechanism, which presupposes dissociation (destruction) of the centers, and the electron-hole mechanism, which is tantamount to formation of a center of a new type. It is still unclear which of these mechanisms predominates. It is noted in conclusion that the effect observed in this investigation can be used for an analysis of the optical TR^{3+} centers in crystals by observing the inhomogeneous change in the absorption-line intensity following irradiation. In addition, a study of the optical properties of the TR^{3+} centers in irradiated crystals can yield valuable information on the character of the processes which occur when hard radiation interacts with crystalline matter. Orig. art. has: 3 [02]

SUB CODE: 20/ SUBM DATE: 29Sep65/ ORIG REF: 004/

OTH REF: 003 ATD PRESS

4483

Card

2/2

VORON'KO, Yu.K.; KAMINSKIY, A.A.; OSIKO, V.V.

Analysis of the optical spectra of Pr^{3+} , Nd^{3+} , Eu^{3+} , and Er^{3+} in
fluorite crystals (type 1) by the method of concentration series.
Zhur. eksp. i teor. fiz. 49 no.3:724-729 S '65. (MIRA 18:10)

1. Fizicheskiy institut imeni Lebedeva AN SSSR.

VORON'KO, Yu.K.; KAMINSKIY, A.A.; OSIKO, V.V.

Optical relaxation of Ho³⁺ and Er³⁺ ions in the CaF₂ lattices
(Type I) in the visible range of wavelengths. Zhur.eksp.i
teor.fiz. 49 no.4:1022-1027 O '65. (MIRA 18:11)

1. Institut kristallografiil AN SSSR i Fizicheskiy institut
imeni Lebedeva AN SSSR.

VORON'KO, Yu.K.; ZVEREV, G.M.; PROKHOROV, A.M.

Induced radiation from Er³⁺ ions in CaF₂. Zhur. eksp. i teor. fiz. 48 no.6:1529-1532 Je '65. (JINR A 18:7)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

VORON'KO, Yu.K.; KAMINSKIY, A.A.; OSIKO, V.V.

Analysis of the optical spectra of $\text{CaF}_2 - \text{Nd}^{3+}$ crystals (Type 1).
Zhur. eksp. i teor. fiz. 49 no.2:420-428 Ag '64. (MIRA 12:9)

1. Fizicheskiy institut imeni Lebedeva AN SSSR.

L 5040-66 CMI(l)/EWT(m)/T/EWP(t)/EWP(b)		LWP(c)	JD/JG/GG
ACC NR:	AP5026588	SOURCE CODE:	
UR/0056/65/049/004/1022/1027			
AUTHOR: Voron'ko, Yu. K.; Kaminskij, A. A.; Onikov, V. I.			
ORG: Institute of Crystallography, Academy of Sciences, SSSR (Institut kristallografiia Akademii nauk SSSR); Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)			
TITLE: Optical relaxation of Ho ³⁺ and Er ³⁺ ions in the CaP ₂ lattice (Type I) in the optical wavelength region			
SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 4, 1965, 1022-1027			
TOPIC TAGS: laser, lifetime, calcium bifluoride, Holmium ion, erbium ion, nonradiative transition, luminescence spectrum, absorption spectrum, rare earth ion			
ABSTRACT: The lifetimes of the 5S ₂ and 5P ₅ excited states of Ho ³⁺ and the 4S _{3/2} and 4P _{9/2} states of Er ³⁺ in CaP ₂ host crystals (activator concentration 0.01—2% by weight) were investigated in the range of temperatures of 77—300K. An analysis made of the influence of non-radiative transitions on the reduction of lifetimes of the excited states included a discussion of the possible causes of the failure			

Card 1/2

L 5040-66

ACC NR: AP5026588

to obtain generation in the yellow-green of the spectrum of $\text{CaF}_2:\text{Er}^{3+}$ at 77K. The samples were cut from crystals into cylindrical rods of various lengths. The ends were polished. Emission was excited by a stroboscopic lamp, and a photomultiplier with a multiple alkali metal cathode was employed for oscilloscope display. The experiments showed a shortening of the excited state lifetimes with increasing concentrations of Ho^{3+} and Er^{3+} ions in CaF_2 , which may be explained by a mutual dipole-dipole magnetic interaction of the ions. At room temperature, nonradiative transmissions, which significantly shorten the lifetimes of spontaneous transmissions, played an essential part. In the case of $\text{CaF}_2:\text{Er}^{3+}$, an anomalous dependence of lifetimes on the concentration was found for the $^4\text{S}_{3/2} \rightarrow ^4\text{I}_{15/2}$ transition at 77K. Orig. art. has: 5 figures.

[ZL]

SUB CODE: 55, OP/ SUBM DATE: 08Apr65/ ORIG REF: 005/ OTH REF: 005

ATD PRESS: 4/32

PC
Card 2/2

ACC NR: AP5025788 SGTB/IUP(c) RU/ML		SOURCE CODE: UR/0363/65/001/009/1521/1525
AUTHOR: Voron'ko, Yu. K.; Kaminskiy, A. A.; Osiko, V. V.; Chaikov-Mal'kov, V. Ya.		
ORG: Institute of Crystallography, Academy of Sciences, SSSR (Institut kristallografii Akademii nauk SSSR); Physics Institute im. P. N. Lebedev, Academy of Sciences, SSSR (Fizicheskiy institut Akademii nauk SSSR)		
TITLE: Investigation of the optical inhomogeneity of CaF ₂ :Nd ³⁺ laser crystals		
SOURCE: AN SSSR. Izvestiya. Neorganicheskiye materialy, v. 1, no. 9, 1965, 1521-1525		
TOPIC TAGS: laser, solid state laser, laser rod, laser crystal, fluorite, fluorite laser, optical inhomogeneity, excitation threshold		
ABSTRACT: Experiments were performed to determine the effect of different types of optical inhomogeneities on the excitation threshold of CaF ₂ laser rods doped with 0.5% Nd ³⁺ . Crystals 150 mm long with a 15-mm diameter were grown from the same melt under identical conditions and had the same concentration of active impurities. Thirteen laser rods, each about 73 mm long and 6.5 mm in diameter, were fabricated from the crystals. Measurements of the excitation threshold, the gradient of the index of refraction, the local inhomogeneities, and small angle scattering showed that the optical defects differed from crystal to crystal. These differences were attributed to minute, uncontrollable variations in the temperature regime during the growth process and to differences in the crystallographic orientation of the growing crystals. It was estab-		
Card 1/2	UDC: 546.41'161.5'18.55	

L 3725-66

ACC NR: AP5025788

Lished that the scattering angle of a beam from a He-Ne laser directed along the geometrical axis of the rod shows the greatest amount of correlation with the excitation threshold of the laser rod. This parameter should therefore be used in selecting the CaF₂:Nd³⁺ crystal rods to be used in lasers. Orig. art. has 8 Figures and 1 table.

SUB CODE: 6S/ SUBM DATE: 02Jun65/ ORIG REF: 008/ OTH RPT: 000/ ATD PRESS: 420 [CS]

Card 2/2

VORON'KO, Yu.K.; OSIKO, V.V.; UDOVENCHIK, V.T.; FURSIKOV, M.M.

Optical properties of $\text{CaF}_2 - \text{Dy}^{3+}$ crystals. Fit. tver. tela 7
no.1:267-273 Ja '65. (MIRA 18:3)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moskva.

VORON'KO, Ye.K.; KROTOVA, L.V.; CSJKO, V.V.; UDCVENCHIK, V.T.; FURSIKOV, M.M.

Optical properties of $\text{CaF}_2 - \text{Nd}^{3+}$ crystals. Pis. vyd. tele
7 no.6:1800-1807 Je '65. (MIRA 18:6)

1. Fizicheskiy institut imeni Lebedeva AN SSSR, Moscow

L 2329-66 EWA(k)/FBD/EWT(1)/EWT(m)/EFF(c)/EEC(k)-2/T/EWP(1)/EWT(1)/EWP(b)/
EWA(m)-2/EWA(h) SGTB/IJP(c) K3/JD/JW/JG

ACCESSION NR: AP5024560

UN/CD10/65/010/005/0746/0747
946.0 62

AUTHOR: Bagdasarov, Kh. S.; Voron'ko, Yu. K.; Kaminskii, A. A.; Orikho, V. V.; Prokhorov, A. M.

TITLE: Stimulated emission of neodymium-doped yttrifluorite at room temperature

SOURCE: Kristallografiya, v. 10, no. 5, 1965, 746-747, and top half of insert facing p. 743

TOPIC TAGS: solid state laser, neodymium, yttrifluorite, stimulated emission

ABSTRACT: Certain basic characteristics of a neodymium-doped yttrifluorite (CaF_2-YF_3) laser operating at room temperature on two wavelengths are described. The present work is part of a study to improve the optical properties of active materials for fluorine-compound lasers. Type I CaF_2-YF_3 crystals with 0.1-0.5% (by weight) concentrations of Nd^{3+} were used. Generation at ~ 10461 and $\sim 10640 \text{ \AA}$ corresponded to threshold energies of ~ 130 and $\sim 35 \text{ J}$, respectively, supplied to a standard IFP-800 xenon flashlamp. The flashlamp was surrounded by a tubular glass (ZLS-17) filter in order to prevent undesirable aging of the neodymium. The space between the flashlamp and filter was filled with cooling water. The working crystals

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ACCESSION NR: AP5024560

were in the form of cylindrical rods with polished ends (parallel within 10--20°), each ~75 mm long and ~6.5 mm in diameter. Confocal external mirrors were used which had an ~0.9% transmission at 1.06 μ . The mirrors were 20 cm in diameter and had a radius of curvature of 500 mm. The linewidths at ~10461 Å and ~10640 Å were ~0.8 cm⁻¹ and ~3 cm⁻¹, respectively, at 300K. The most intense luminescence was due to the $^4F_{3/2} \rightarrow ^4I_{11/2}$ transition, and the lifetime of the excited $^4F_{3/2}$ state of a $\text{CaF}_2\text{-YF}_3$ crystal with a 0.5% Nd³⁺ concentration at 300K was ~1 msec. The results show further that the generation in the described system occurs at a considerably lower threshold than in the case of known crystals based on fluorine compounds [1] and $\text{Gd}_2\text{O}_3\text{:Nd}^{3+}$ are known to lase at two wavelengths at 300K with lower thresholds. Orig. art. has: 3 figures. [YK]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva (Physics Institute); Institut kristallografi AN SSSR (Institute of Crystallography, AI SSSR)

SUBMITTED: 07 May 65

NO REF Sov: 004 27
Rare Earth Compounds

Card 2/2 *(Red)*

ENCL: 00

OTHER: 002

SUB CODE: EC

ATTD PRESS: 4/07

AUTHOR: Voron'ko, Yu. K.; Kaminskii, A. A.; Osiko, V. V.

TITLE: Analysis of optical spectra of $\text{CaF}_2-\text{Nd}^{3+}$ crystals

SOURCE: Zhurnal eksperimental'noi i teoretičeskoy fiziki, v. 42, no. 2, p. 441.
420-428

TOPIC TAGS: laser, fluorite/laser, neodymium doped laser, laser emission spectrum, paramagnetic laser

ABSTRACT: The "concentration series" method was used for the spectral analysis of rare-earth ions in type-I CaF_2 crystals. The designation "type-I" was taken from the crystallochemical classification of V. V. Osiko (Rost. krištallogr., 5, Izd. Akad. SSSR, 1965). The aim of the analysis was to determine the substitutability of Nd^{3+} as a component of the crystal lattice of the type-I CaF_2 crystal. The results of the analysis show that the concentration series of the Nd^{3+} ion in the CaF_2 crystal lattice is determined by the following equation:

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temperature of the sample was measured in deg. K by a DSC-2000C in 1988. The sample was heated and cooled at 10 deg. K/min. The number of absorption lines (approximately 40) decreased with increasing temperature. The first absorption line was observed at 100 deg. K. The last absorption line was observed at 200 deg. K. The absorption lines were observed at 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790, 1800, 1810, 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060, 2070, 2080, 2090, 2100, 2110, 2120, 2130, 2140, 2150, 2160, 2170, 2180, 2190, 2200, 2210, 2220, 2230, 2240, 2250, 2260, 2270, 2280, 2290, 2300, 2310, 2320, 2330, 2340, 2350, 2360, 2370, 2380, 2390, 2400, 2410, 2420, 2430, 2440, 2450, 2460, 2470, 2480, 2490, 2500, 2510, 2520, 2530, 2540, 2550, 2560, 2570, 2580, 2590, 2600, 2610, 2620, 2630, 2640, 2650, 2660, 2670, 2680, 2690, 2700, 2710, 2720, 2730, 2740, 2750, 2760, 2770, 2780, 2790, 2800, 2810, 2820, 2830, 2840, 2850, 2860, 2870, 2880, 2890, 2900, 2910, 2920, 2930, 2940, 2950, 2960, 2970, 2980, 2990, 3000, 3010, 3020, 3030, 3040, 3050, 3060, 3070, 3080, 3090, 3100, 3110, 3120, 3130, 3140, 3150, 3160, 3170, 3180, 3190, 3200, 3210, 3220, 3230, 3240, 3250, 3260, 3270, 3280, 3290, 3300, 3310, 3320, 3330, 3340, 3350, 3360, 3370, 3380, 3390, 3400, 3410, 3420, 3430, 3440, 3450, 3460, 3470, 3480, 3490, 3500, 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L 2129-66 EFT(m)/EPF(c)/ENP(t)/EMP(b) IJP(c) JD/JW/JG
ACCESSION NR: AP5024688 UR/0056/65/049/003/0724/0729

AUTHOR: Voron'ko, Yu. K.; Kaminskiy, A. A.; Osiko, V. V.

TITLE: Analysis of optical spectra of Pr^{3+} , Nd^{3+} , Eu^{3+} , and Er^{3+} in fluorite crystals by the "concentration series" method

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 3, 1965, 724-729

TOPIC TAGS: fluorite, fluorite spectrum, doped fluorite, doped fluorite spectrum, admixture spectrum, dope spectrum, spectral analysis, absorption spectra, luminescence spectra

ABSTRACT: A new experimental method for the analysis of absorption and luminescence spectra of type-1 CaF_2 crystals with admixtures of rare-earth ions (TR^{3+}) is described and the investigation results are discussed. The crystal classification is that of V. V. Osiko (Rost Kristalloy, 5, Izd. AN SSSR, 1965). The designation "concentration series" refers to the staggered admixture concentration in the set of samples used for the investigation. The method is based on the difference in the character of concentration dependence of various admixtures. This character is specific for structurally different admixture centers as a function of the

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overall concentration of the rare-earth admixture in the crystal at equilibrium temperature. Thus, at low concentrations the greatest number of TR^{3+} ions are found in cubic centers. With an increased concentration, the tetragonal centers increase and exceed the number of cubic centers at a concentration of 10^{-3} . A further concentration leads to an increasing proportion of rhombic centers. The concentrations investigated ranged from 0.003 to 2% by weight of each kind of admixture. Special care was taken to insure perfect uniformity of the specimens (except for admixture concentrations) and even distribution of the centers. Preliminary studies of absorption spectra were carried out at 77K by the SP-700 spectrophotometer within the 0.185 to 2.5 μ range. Further investigations concerned the selected line groups most convenient for study. The absorption in these groups was determined by the DFS-12 defraction spectrometer with a 0.1 Å resolution at 77K. A photomultiplier with an oxygen-cesium photocathode was used to detect the light pulses which were amplified and recorded by an EPP-09M1 potentiometer. The concentration series of absorption curves thus obtained clearly displayed a redistribution of line intensities with the increase of concentration of a given admixture. The peak values of absorption coefficients were then determined for each spectral group. The dependence of absorption coefficients on concentration, charted in the double logarithmic scale, showed families of parallel curves of distinct character, each family representing a

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different kind of admixture. A similar intensity redistribution effect was obtained in the investigation of the luminescence spectra. A strong reabsorption of resonance lines, however, prevented a quantitative evaluation. By combining the analysis by the concentration series method with spectrum study at helium temperatures it is possible to construct the pattern of energy levels for each type of center. To identify the specific line groups with definite center structures however, the concentration series method must be used in combination with some other method. Orig. art. has: 4 figures. [TP]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences, SSSR)

SUBMITTED: 10Mar65

ENCL: 00

SUB CODE: SS, OP

NO REF SOV: 006

OTHER: 002

ATD PRESS #417

Card 3/3

ICITE/III(c) 43/1D/13/2; 5/10/86 Pg-4/Pg-4/Pg-4/Pg-4/Pg-4/Pg-4/Pg-4
ACCESSION ID: A9514.9

UR/0386/001/001/002/003/0007

AUTHOR: Voron'ko, Yu. K.; Kaminskiy, A. A.; Korpiyanenko, I. S.; Dzitko, V. V.
Frokhoro, A. E.; Udovenchik, V. T.

TITLE: Investigation of the stimulated emission in $\text{CaF}_2:\text{Nd}^{3+}$ crystals (type III)
at room temperature

SOURCE: Zhurnal eksperimental'nov i teoretičeskoy fiziki, v. 61, no. 2, 1967, p. 571, and insert A

TOPIC TAGS: neodymium, calcium compound, stimulated emission, paramagnetic laser, room temperature laser

ABSTRACT: The present work, a continuation of earlier research (ZhETP, 46, 1964, 386) in which the authors obtained stimulated emission at $\lambda = 0.67 \mu$ in $\text{CaF}_2:\text{Nd}^{3+}$ (type I) crystals at 300K, gives preliminary results for laser action at $\lambda = 0.85 \mu$ in $\text{CaF}_2:\text{Nd}^{3+}$ (type II) crystals at 300K. Type II crystals, unlike type I crystals, contain oxygen and chlorine in their neodymium optical centers. The starting materials, which had 0.2-0.3% Nd^{3+} concentrations, were in the form of cylindrical rods having polished ends with an accuracy of $\pm 1\%$. The diameter and length of the rods were 16.0 mm and 75 mm, respectively. The optical resonator consisted of externally

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ACCESSION NR: AP5014193

mounted confocal dielectric mirrors (radius of curvature, 900 mm; diameter, 40 mm); mounted xenon lamp was used for pumping. Laser emission wavelength, 308 nm. At 1000 Hz repetition rate, the lifetime of the excited state at 308 nm was measured by means of a tachometer developed for this purpose as 1.25 usec. At 300 Hz, the type II laser operates at a lower frequency of 1.25 ms than any other known neodymium laser. Orig. art. has: 1 table and 3 figures.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo Gosudarstvennogo Universiteta (Institute of Nuclear Physics, Moscow State University); Fizicheskiy Institut Akademii nauk SSSR (Physics Institute, Academy of Sciences, USSR)

SUBMITTED: 03/01/01 REC'D: 03/01/01 SUB CODE: EC-5-3
NO REF SOV: 002 NUMBER: 0018 ACT PROB#S: 4015

Card 2/2

1966-1967 104 pages

Chemical-doped centers in crystals

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu
Prilozheniya, v. 1, no. 4, 1965, 31-39

TOPIC TAGS: laser material, rare earth, absorption spectrum, Stark effect

ABSTRACT: The active medium in most solid-state lasers today is a crystal doped with rare-earth ions. For various reasons such crystals behave quite differently, and this study analyzes rare-earth active centers to determine the right absorption spectra of rare-earth doped crystals (in this case CaF₂-Er³⁺) in which the centers have two types of centers associated with different energy levels. The experimental arrangement consists of a mercury lamp source, a photodetector, glass Dewar, quartz light conductors, test sample, prism, and a spectrophotograph. The apparatus can be used to select a band width of 10 nm or 0.5 nm from a range of 100 nm spectral width.

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L 5M129-65

ACCESSION NR: AP5014227

Both static and dynamic methods are used in producing excitation: in the first, excitation is produced in a preselected absorption line; in the second, the wavelengths of the excitation light are scanned. The dynamic luminescence spectra for the transition metal complexes of Cr(II) and Cr(III) are shown, and the results of the analysis of luminescence spectra are discussed. The method of excitation is also discussed.

The analysis of luminescence spectra is based on the theory of the energy level transitions between the excited states of the molecules.

The method of excitation is based on the theory of the energy level transitions between the excited states of the molecules.

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ACCESSION NO.: A14-1324

UN/0181465/047/006/1800/1400

BY: V. M. Korotko, Z. S. Kratova, V. V. Oelko, V. V. Ulyanovskiy, T. I. Butina

PUBL: Optical properties

DATE: April 1966

TOPIC TAGS: absorption spectrum, luminescence spectrum, fluorescent crystal, lanthanum activation, optical properties of lanthanide crystal, lanthanide crystal, lanthanide crystal, grown by different methods, having different thermal characteristics.

The absorption and luminescence spectra of lanthanide-doped lanthanide crystals contain ions of lanthanides, which have different absorption and emission bands at different wave lengths, depending on the lanthanide ion and its concentration. The absorption and emission bands of lanthanide ions are very strong at low temperatures, but they decrease at higher temperatures.

ABSTRACT: Optical methods were used to investigate a large number of lanthanide crystals, grown by different methods, having different thermal characteristics. The absorption and luminescence spectra of lanthanide-doped lanthanide crystals contain ions of lanthanides, which have different absorption and emission bands at different wave lengths, depending on the lanthanide ion and its concentration. The absorption and emission bands of lanthanide ions are very strong at low temperatures, but they decrease at higher temperatures.

L 55120-65
ACCESSION NR: AP5014584

to those described by T. Kondo, Chem. Phys., v. 36, 1476, 1969), were obtained by the method of vapor diffusion in a nitrogen atmosphere, while crystals of type II were obtained by cooling the solution in the form of a film. The dependence of the volume and of the density of the crystals on the concentration of the solution was studied. The relative change takes place with the increase of the concentration of the initial reagent. The number of components of the system is increased with the number of components of the solution. The dependence of the volume and of the density of the crystals on the concentration of the solution is also observed. The dependence of the volume and of the density of the crystals on the concentration of the crystals of type I, orig. art. was investigated.

REFERENCES: 1. V. V. Lebedeva, A. V. Sosulin, N. S. Kosetskii (Physics and Chemistry of Inorganic Materials, v. 10, No. 1, 1974); 2. V. V. Lebedeva, A. V. Sosulin, N. S. Kosetskii (Izv. Akad. Nauk SSSR, Ser. Khim., No. 10, 1974).

REVIEWED: 10/20/74 APPROVED: 10/20/74 SUBMITTED: 10/20/74

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1. *What is the best way to*

7/17/13 - 31.1mm x 1.6cm dia. 1.25" min. dia. 10" long. In Cu #2

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 65, no. 6, 1969
1529-1532

TOPIC TAGS : [stimulation](#) [enhancement](#) [client-centered](#) [therapeutic](#) [counseling](#)

ABSTRACT: The authors obtained stimulated emission from Er³⁺ ions in CaF₂ crystal at 1.54 μm wavelength. The stimulated emission was observed near 1.54 μm. The pumping source was a pulsed Nd:YAG laser operating at 1.06 μm. The stimulated emission signal was detected by a photomultiplier tube. The stimulated emission intensity was measured as a function of the pumping intensity. The stimulated emission intensity increased with increasing pumping intensity. The stimulated emission intensity was also measured as a function of the temperature. The stimulated emission intensity decreased with increasing temperature.

CHAP. 2

ACCESSION NO.: 4776.30 - 1

excitation was provided by a xenon flash lamp. At about 1000 μ threshold energy emission occurred at 1000 μ . When excitation was provided by a carbon arc at 1000 μ emission occurred at 1000 μ and at 1000 μ . The following table gives the results.

Graduate student funding from the State University.

SUBMITTED: 23 Jun 64 XNCL: 00 BILB CODE: DC, SS
REF S/N: AX OFFICER: 002 ATC PRESS: 46-54

10-2

APPROVED FOR RELEASE: 03/20/2001 CIA-RDP86-00513R001860920001-4"

ACCESSION NR. A191502

URSS (Soviet Union)

AUTHOR: Voron'ko, Yu. K.; Kaminskij, A. N.; Osiko, V. V.; Trokitev, A. M.

TITLE: Stimulated emission of CaF_2^{+} at $\lambda 5912 \text{ \AA}$

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniya, v. 1, no. 1, 1965, 45-9

TOPIC TAGS: laser, calcium fluoride, calcium fluoride laser, stimulated emission, coherent light fluorite

ABSTRACT: The present article, in the form of a letter to the editors, provides preliminary data on a CaF_2^{+} -He $^{3+}$ laser operating in the middle of the visible spectral range at $\lambda 5912 \text{ \AA}$ at a temperature of 77K. The source of the laser action was a rod of a dielectric material. The diameter of the rod was 1.5 mm. The rod was placed in a cylindrical water-cooled jacket. The jacket was connected to a thermostatic bath. Laser action was attained by pumping the rod with a beam of a pulsed electron gun. The oscillation threshold was 100 mA. The current density in the rod was 100 A/mm². The energy difference between the excited and a stationary state was 1.4 eV. The energy difference between the ground level and the excited state was 0.6 eV. The energy difference between the excited state and the ionization potential was 0.8 eV. A schematic diagram of the article is shown in figures.

Card 1 of 2

4 45720-65

ACCESSION NR: AP5013663

ASSOCIATION: Fizicheeskiy institut im. P. N. Lebedeva Akademii nauk SSSR (Physics Institute, Academy of Sciences USSR); Institut Yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Institute of Nuclear Physics of Moscow State University)

SEARCHED: 25/000

ENCL: 00

SUB CODE: OP

NO. REF. SOY: 002

ORIGIN: 00

ADD PROB: 4001

Cont 2/2

ROGOV, Yu.G.; ROGOVA, V.P.; VORONKOV, A.A.; MOLEVA, V.A.

New mineral "tinacosit" $\text{NaK}_2\text{Ca}_2\text{TiSi}_7\text{O}_{19}(\text{OH})$. Dokl. AN SSSR 162
no. 3:658-661 My '65. (MIRA 18:5)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh
elementov AN SSSR. Submitted December 28, 1964.

VORONKOV, A.; CHARINN, S.; KASTEL, I.; KRESTOV, M.; MOISEYENKO, A.;
PALLADINA, G.A., red.izd-va; TOKER, A.M., tekhn.red.

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otdelochnykh rabot; soobshchenie...[Moskva, Gos.izd-vo lit-ry po
stroit. i arkhit., 1955] 29 p.
(MIRA 11:6)
(Building)

VORONKOV, A.

527N/5

Dvorets Nauki (Palace of Science, By) A. Voronkov (l) S. Balashov
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238 P. Illus.

831.2

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Bezop.truda v prom. 4 no.8;35 Ag '60.
(MIRA 13:8)
(Coal mines and mining--Safety measures)

VORONKOV, A., inzh.; KLEMENT'YEV, Yu., inzh.

Under the banner of our country. IUn.tekh. 6 no.12:14-16 D '61.
(MIRA 14:12)
(Merchant marine)

VORONKOV, A.

Along the unbeaten track. IUn. nat. no.6:4-6 Je '61.

(MIREA 14:7)

1. Leningradskaya oblast, poselok Tosno.
(Tosno—Agriculture—Experimentation)

VORONKOV, A.

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1. Nikol'skaya shkola, Leningradskaya oblast'.
(Beans) (Children in agriculture)

1. VORONOV, A., Eng.
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GRINEV, A. (Chelyabinsk); SVISTUNOV, A. (Chelyabinsk).

On the fighting stand. Pozh.delo 5 no.7:27 Jy '59.
(MIRA 12:9)

1. Starshiy inspektor Upravleniya pozharnoy ochrony Armenii
(for Grigoryan).
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VORONKOV,A.

New standards for ship repairs. Mor. flot 15 no.6:18-20 Je '55.
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"Kinetics of the Process of Drying of Fine Peat."

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in the diagnosis of congenital diseases of the heart and large vessels."
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-181-

VORONOV, A.A.; BATALIYEVA, N.G.; PYATENKO, Yu.A.

Crystalline structure of stilwellite. Kristallografiia 9 no.4:
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1. Institut mineralogii, geokhimii i kristallokhimii redkikh
elementov AN SSSR.

PYATENKO, Yu.A.; VORONOV, A.A.

Formula of gagarinite. Zhur. strukt. khim. 3 no.6:720-721 '62.
(MIRA 15:12)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh
elementov.

(Minerals)

(Crystallography)

70-3-2-23/26

AUTHOR: Voronkov, A.A.

TITLE: Growth of Single Crystals of Sulphate Hemihydrates
(Vyrashchivaniye monokristallov semivodnykh sul'fatov)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 2, pp 240 - 243
(USSR).

ABSTRACT: Crystals with the chemical formula $M\text{SO}_4 \cdot 7\text{H}_2\text{O}$, where $M = \text{Mg, Ni or Zn}$ were studied. All crystals have the same space group $P2_1^21^21 = D_2^4$. In order of decreasing solubilities they are $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$, $(\text{Mg, Zn})\text{SO}_4 \cdot 7\text{H}_2\text{O}$, $(\text{Mg, Ni})\text{SO}_4 \cdot 7\text{H}_2\text{O}$, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$. All these sulphates are characterised by the existence of a large number of different crystalline hydrates. The form with 7 molecules of water is stable only below a certain temperature. Crystals were most satisfactorily grown dynamically in a crystalliser on 1-2 litres capacity stabilised to 0.05° with a thermostat at 33-35° C. Zinc and magnesium sulphate seeds, supported on plastic tables were grown at this temperature and nickel sulphate at less than 30.5° C. A rod-shaped nucleus was also satisfactorily used to grow crystals.

Card 1/2

Growth of Single Crystals of Sulphate Hemihydrates

70-3-2-23/26

between two plastic plates. Relative growth rates were found to be Mg sulphate parallel to c 4, perp. to c 1.5; Zn sulph. par. to c 2.5, perp. to c 1.2; Ni sulph. par. to c 1.4, perp to c 0.7. Mixed crystals produced from solutions containing 50 mol% of the relevant components had the compositions $5\text{MgSO}_4 \cdot 6\text{NiSO}_4 \cdot 77\text{H}_2\text{O}$ and $5\text{ZnSO}_4 \cdot 6\text{MgSO}_4 \cdot 77\text{H}_2\text{O}$.

In air at room temperature all the crystals effloresced. There are 3 figures and 6 references, 4 of which are Soviet and 2 German.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet imeni M.V. Lomonosova (Moscow State University im. M.V. Lomonosov)

SUBMITTED: September 4, 1957

Card 2/2

SOV/70-3-6-10/25

AUTHOR: Voronkov, A.A.

TITLE: The Piezoelectric, Elastic and Dielectric Properties of Crystals of $MgSO_4 \cdot 7H_2O$ (P'yezoelektricheskiye, uprugiye i dielektricheskiye svoystva kristallov $MgSO_4 \cdot 7H_2O$)

PERIODICAL: Kristallografiya, 1958, Vol 3, Nr 6, pp 716-719 (USSR)

ABSTRACT: Crystals of $MgSO_4 \cdot 7H_2O$ are orthorhombic with class 2:2, They occur as epsomite. Synthetic crystals were prepared which showed the forms (010), (111) and (010). The structure breaks up at 48.2°. Optical goniometric measurements agree well with those in Groth. Dielectric measurements made at 1 kc/s gave:

$$e_{11} = 5.40 \pm 0.06, e_{22} = 5.23 \pm 0.03, e_{33} = 5.79 \pm 0.05$$

A capacity bridge and three plates cut perpendicular to the axes were used. Elastic constants were measured by a resonance method. For the s_{ik} coefficients ($i,k = 1,2,3$) plates of oblique X, Y and Z cuts were used and longitudinal compression/extension oscillations were excited. The compliances found were:

Card1/3

SOV/70-3-6-10/25

The Piezoelectric, Elastic and Dielectric Properties of Crystals
of $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$

$$s_{11} = 5.26 \pm 0.10 \times 10^{-12}$$

$$s_{22} = 6.22 \pm 0.01$$

$$s_{33} = 5.69 \pm 0.01$$

$$s_{44} = 13 \pm 0.05$$

$$s_{55} = 6.23 \pm 0.10$$

$$s_{66} = 12.07 \pm 0.02$$

$$s_{12} = -2.68 \pm 0.01$$

$$s_{13} = -1.70 \pm 0.02$$

$$s_{23} = -2.47 \pm 0.01$$

Their temperature coefficients over the interval
 $10^\circ - 30^\circ$ were found to be:

$$Ts_{11} = 6.32 \times 10^{-4}$$

$$Ts_{22} = 8.68$$

$$Ts_{33} = 10.36$$

$$Ts_{44} = 12.30$$

$$Ts_{55} = 9.62$$

$$Ts_{66} = 7.95$$

$$Ts_{12} = 13.67$$

$$Ts_{13} = -0.88$$

$$Ts_{23} = 8.21$$

Card 2/3

The Piezoelectric, Elastic and Dielectric Properties of Crystals
of $MgSO_4 \cdot 7H_2O$ SOV/70-3-6-10/25

The piezoelectric moduli were determined by the difference between the resonant and anti-resonant frequencies for plates of three cuts X-45°, Y-45° and Z-45°. The accuracy is not better than about 5%. In c.g.s.u. they are $d_{14} = -6.0 \pm 0.3 \times 10^{-8}$, $d_{25} = -7.2 \pm 0.3$, $d_{36} = 10.8 \pm 0.3$. The signs of these piezoelectric moduli were found from static experiments on a cube. Acknowledgments to Academician A.V. Shubnikov. There are 4 figures and 4 references, 2 of which are Soviet and 2 German, and 1 table.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im.
M.V.Lomonosova (University im. M.V. Lomonosov)

SUBMITTED: April 25, 1958

Card 3/3

ZHABIN, A.G.; VORONKOV, A.A.; KHALEZOVA, Ye.B.; KAZAKOVA, M.Ye.

New data on accessory davidite from the Vyakhnevyye Mountains
in the Ural Mountains and the so-called "ufertite" and
"ferutite." Trudy IMCRE no.15:110-120 '63. (MIRA 16:11)

VORONKOV, A.A.; PYATENKO, Yu.A.

Crystal structure of vlassovite. Kristallografiia 6 no.6:937-
943 N-D '61. (MIR 14:12)

1. Institut mineralogii, geokhimii i kristallokhimii redkikh
elementov.

(Silicates)
(Crystallography)